

Algebra 2 Trig 1
Review Systems of Equations/inequalities

Name Key
Block _____ Date _____

Three methods of solving systems of eqns: graphing, substitution, elimination

Types of Solutions:

One Solution

independent

No Solution

inconsistent

Infinitely Many Solutions

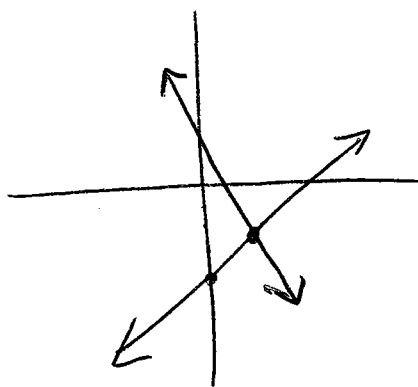
dependent

Practice Problems

Solve these by graphing (sketch the graph):

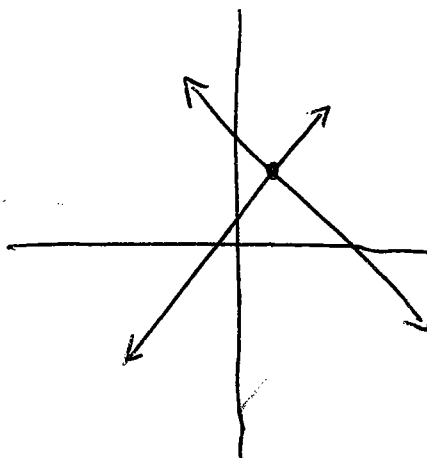
1. $y = -3x + 4$
 $y = x - 4$

$(2, -2)$



2. $y = 3x + 1$
 $y = -x + 5$

$(1, 4)$



Solve using elimination

3. $-3(2x - 5y = -19)$
 $2(3x + 2y = 0)$

$$-6x + 15y = 57$$

$$6x + 4y = 0$$

$$19y = 57$$

$$y = 3$$

$$3x + 2(3) = 0$$

$$3x + 6 = 0$$

$$3x = -6$$

$$x = -2$$

$(-2, 3)$

4. $8x + 6y = 12$
 $2(-4x - 3y = -6)$

$$8x + 6y = 12$$

$$-8x - 6y = -12$$

$$0 = 0$$



infinitely many solns.

Solve using substitution:

5.

$$\begin{aligned} x + y &= 10 \\ 3x - 5y &= 8 \end{aligned}$$

$$x = 10 - y$$

$$3(10 - y) - 5y = 8$$

$$30 - 3y - 5y = 8$$

$$-8y = -22$$

$$y = \frac{11}{4}$$

$$x + \frac{11}{4} = 10$$

$$x = \frac{29}{4}$$

$$\left(\frac{29}{4}, \frac{11}{4}\right)$$

6.

$$\begin{aligned} 2x - 3y &= 7 \\ 8x + 6y &= -12 \end{aligned}$$

$$2x = 3y + 7$$

$$x = \frac{3}{2}y + \frac{7}{2}$$

$$8\left(\frac{3}{2}y + \frac{7}{2}\right) + 6y = -12$$

$$12y + 28 + 6y = -12$$

$$18y = -40$$

$$y = -\frac{10}{3}$$

$$2x - 3\left(-\frac{10}{3}\right) = 7$$

$$2x + 10 = 7$$

$$2x = -3$$

$$x = -\frac{3}{2}$$

$$\left(-\frac{3}{2}, -\frac{10}{3}\right)$$

Solve each of the following by the best method. (if it's graphing, sketch the graph)

7.

$$\begin{aligned} x + 2y &= 0 \\ 3x + 4y &= 2 \end{aligned}$$

Subst.

$$x = -2y$$

$$3(-2y) + 4y = 2$$

$$-6y + 4y = 2$$

$$-2y = 2$$

$$y = -1$$

$$x + 2(-1) = 0$$

$$x - 2 = 0$$

$$x = 2$$

$$(-1, 2)$$

8.

$$\begin{aligned} 2(5x + y) &= 3 \\ 10x + 2y &= 0 \end{aligned}$$

elim

$$-10x - 2y = -6$$

$$10x + 2y = 0$$

$$0 \neq -6$$

$$\emptyset$$

9.

$$\begin{aligned} 4x + y &= -1 \\ y &= -5x \end{aligned}$$

Subst.

$$4x + (-5x) = -1$$

$$-x = -1$$

$$x = 1$$

$$y = -5(1)$$

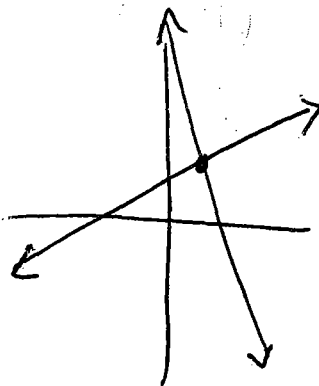
$$y = -5$$

$$(1, -5)$$

10.

$$\begin{aligned} y &= -3x + 14 \\ y &= x + 2 \end{aligned}$$

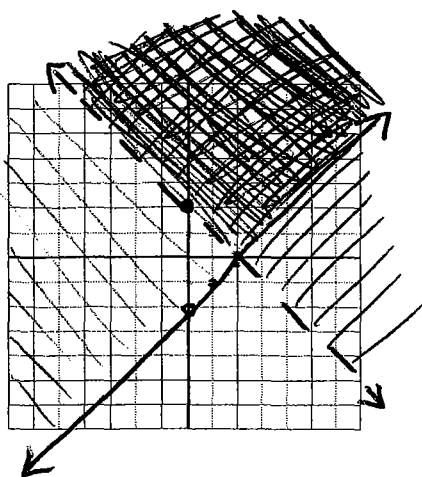
graph



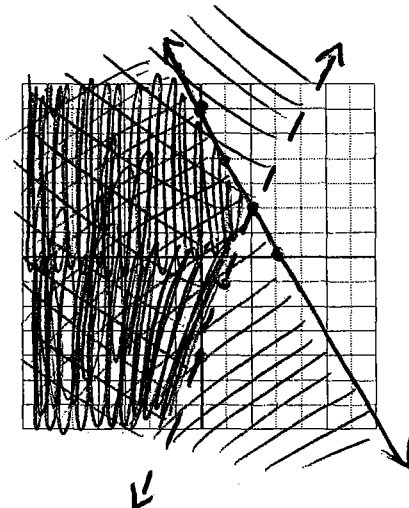
$$(3, 5)$$

Graph the systems of inequalities and SHOW YOUR SOLUTION CLEARLY

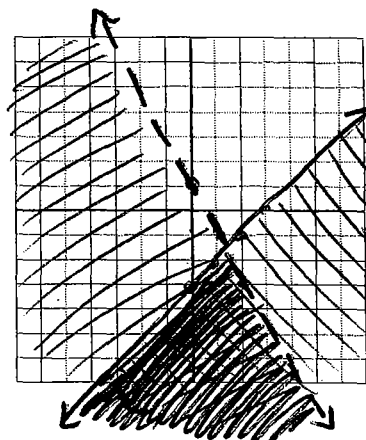
7. $y \geq x - 2$
 $y > -x + 2$



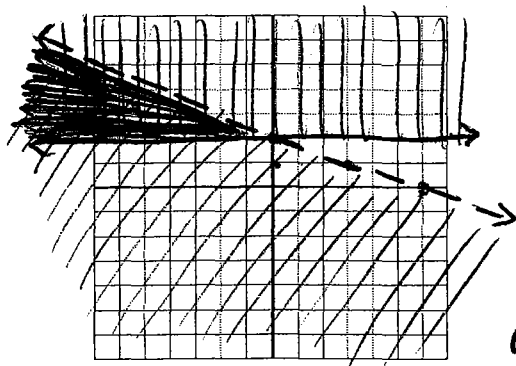
8. $y \leq -2x + 6$
 $y > 3x - 4$



9. $y \leq x - 3$
 $y < -2x + 1$

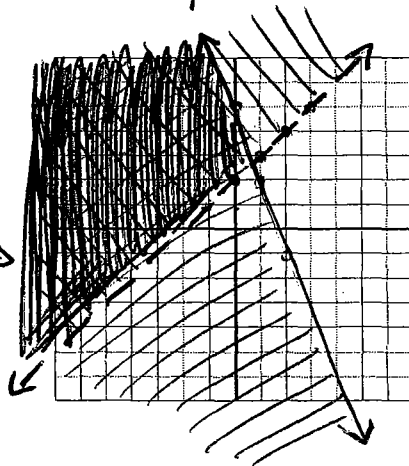


10. $y \geq 2$
 $y < -1/3 x + 2$



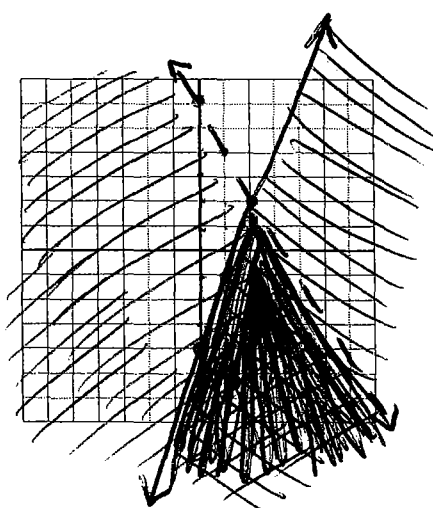
11. $3x + y \leq 5$
 $-x + y > 2$

$y \leq -3x + 5$
 $y > x + 2$



12. $y + 2x < 6$
 $y \leq 3x - 4$

$y < -2x + 6$



Applications

13. You are planning on starting a business and need to pick a company to work with for your office supplies. The first company that you are considering charges a \$200 fee and then \$30 per order. The second company charges a \$150 fee and then \$35 per order. At which point should you switch companies?

Variables

$$x = \text{orders}$$

$$y = \text{total cost}$$

Equations

$$\textcircled{1} \quad y = 200 + 30x$$

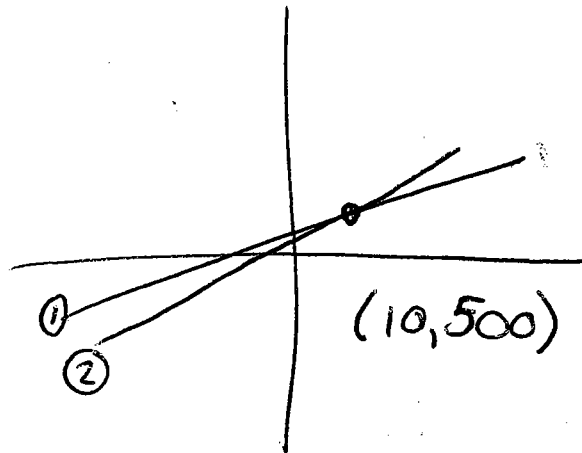
$$\textcircled{2} \quad y = 150 + 35x$$

Solution

- at 10 orders,
the cost will be
\$500 for both

- #2 is cheaper until then,
then #1 is cheaper

graphing



14. You want to buy an aquarium and stock it with goldfish and angelfish. The pet store sells goldfish for \$.40 each and angelfish for \$4 each. You want to spend \$44 and you want to have 38 fish total. How many of each type of fish should you get?

Variables

$$x = \text{goldfish}$$

$$y = \text{angelfish}$$

Equations

$$x + y = 38$$

$$0.4x + 4y = \$44$$

Solution

$$8 \text{ angelfish}$$

$$30 \text{ goldfish}$$

$$x + y = 38$$

$$0.4x + 4y = 44$$

$$\rightarrow x = 38 - y$$

$$0.4(38 - y) + 4y = 44$$

$$15.2 - 0.4y + 4y = 44$$

$$3.6y = 28.8$$

$$\boxed{y = 8}$$

$$\boxed{x = 30}$$

13. Dave steps up to the counter at the local fast-food restaurant and orders three cheeseburgers and an order of fries. He hands the person across the counter a \$10 bill and receives 3.23 in change. How much did Dave's order cost? Jess is next in line and orders three cheeseburgers and three orders of fries for herself and two friends. Jess pays with a \$20 bill and receives \$8.06 in change. How much did Jess's order cost? How much does a cheeseburger cost? How much does an order of fries cost?

Variables

c = cheeseburgers

f = fries

Equations

Solution

cheeseburger costs \$1.40

fries cost \$2.57

$$3c + f = 6.77$$

$$3(1.40) + f = 6.77$$

$$4.20 + f = 6.77$$

$$\boxed{f = 2.57}$$

$$\begin{cases} 3c + f = 6.77 & \text{Dave} \\ 3c + 3f = 11.94 & \text{Jess} \end{cases}$$

$$f = 6.77 - 3c$$

$$3c + 3(6.77 - 3c) = 11.94$$

$$3c + 20.31 - 9c = 11.94$$

$$-6c = -8.37$$

$$c = 1.395 \approx \boxed{\$1.40}$$

14. Blue Mountain rents snowboards for \$65 and skis for \$80. One weekend they rented to 32 people for a total of \$2275. How many of each type of equipment did they rent?

Variables

x = snowboard

y = skis

Equations

$$x + y = 32$$

$$65x + 80y = 2275$$

Solution

13 skis

19 snowboards

$$x + y = 32$$

$$65x + 80y = 2275$$

$$x = 32 - y$$

$$65(32 - y) + 80y = 2275$$

$$2080 - 65y + 80y = 2275$$

$$15y = 195$$

$$\boxed{y = 13}$$

$$\boxed{x = 19}$$

Ch. 1 & 2 review:

Solve. If it is an inequality, graph the solution on a number line.

15. $\frac{1}{2}\left(3x + \frac{1}{4}\right) = 3$

$$\frac{3}{2}x + \frac{1}{8} = 3$$

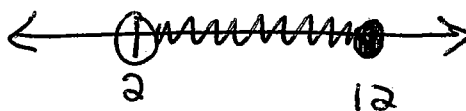
$$\frac{3}{2}x = \frac{23}{8}$$

$$x = \frac{23}{12}$$

16. $4 < \frac{1}{2}(x+6) \leq 9$

$$8 < x+6 \leq 18$$

$$2 < x \leq 12$$



17. $\frac{|3x-1|}{4} < 11$

$$|3x-1| < 44$$

$$3x-1 < 44$$

$$3x < 45$$

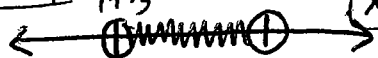
$$x < 15$$

$$-(3x-1) < 44$$

$$-3x+1 < 44$$

$$-3x < 43$$

$$x > -14\frac{1}{3}$$



Determine if the function is linear or non-linear. Then evaluate the at the given value.

19. $f(x) = x^2 - 10$; $f(3)$

non-linear

$$f(3) = -1$$

18. $\frac{|5x+7|}{6} = \frac{78}{6}$

$$|5x+7| = 13$$

$$5x+7=13$$

$$5x=6$$

$$x = \frac{6}{5}$$

$$-(5x+7)=13$$

$$-5x-7=13$$

$$-5x=20$$

$$x = -4$$

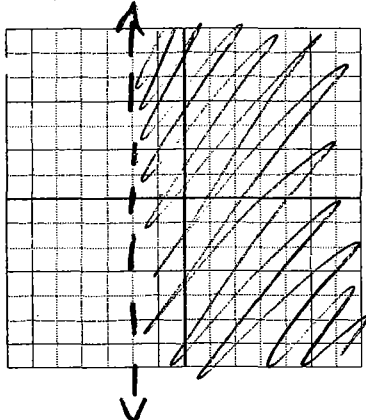
20. $g(x) = -2x + 6x + 3$; $g(-4)$

linear

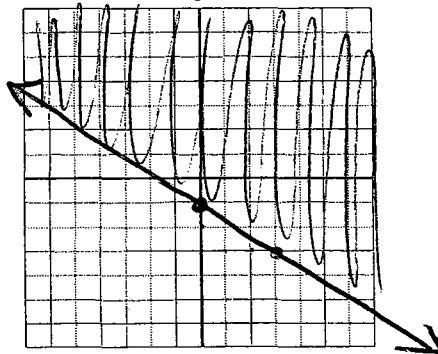
$$g(-4) = -13$$

Graph the following inequalities. List two points that are solutions.

21) $x > -2$



22) $f(x) \geq -\frac{2}{3}x - 1$



$0 \neq -1$
 \checkmark

Find the equation of the line given the following information. Formula: $y - y_1 = m(x - x_1)$

23) Thru $(2, -4)$ and thru $(3, 5)$

$$m = \frac{5 - (-4)}{3 - 2} = \frac{9}{1} = 9$$

$$\begin{aligned} y - (-4) &= 9(x - 2) \\ y + 4 &= 9x - 18 \\ \boxed{y} &= \boxed{9x - 22} \end{aligned}$$

24) $m = -4$ and thru $(3, 7)$

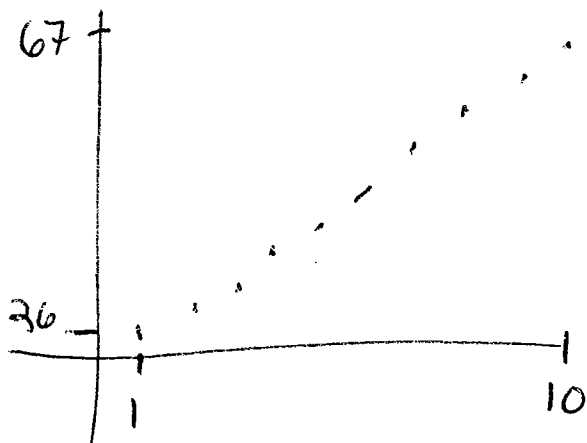
$$\begin{aligned} y - 7 &= -4(x - 3) \\ y - 7 &= -4x + 12 \\ \boxed{y} &= \boxed{-4x + 19} \end{aligned}$$

25) The following table contains employee data for a certain manufacturing company:

Years of Operation	1	2	3	4	5	6	7	8	9	10
Number of Employees	26	29	34	38	44	48	53	59	62	67

In this table, x is the number of years of operation and y is the number of employees working.

a) Sketch a scatterplot for this data below



b) Find the Line of Best Fit

$$y = 4.69x + 20.2$$

c) Find the correlation

$$r = 0.9987$$

e) Using the equation of best fit, predict how many employees will be working in the 12th year. (show work)

$$y = 4.69(12) + 20.2$$

$$\boxed{y = 76.49 \text{ employees}}$$